

## **RICHARD A. CROCOMBE      Crocombe Spectroscopic Consulting**

30 Thornberry Road, Winchester, MA 01890 ■ 508.423.0602 ■ [racrocombe@gmail.com](mailto:racrocombe@gmail.com)

■ [www.spectroscopyconsulting.com](http://www.spectroscopyconsulting.com)

### **Profile**

■ Spectroscopy Thought Leader ■ Focus on miniature, portable, handheld, embedded, wearable and process analyzers ■ Author of authoritative review articles ■ Evangelist for new instrumentation and applications

■ Senior Business Development, R&D and Marketing Executive ■ Strategy development and deployment ■ Leader of multiple cross-functional teams on strategic projects ■ Lead on several acquisitions, integrations and relocations ■ Extensive product development & program management experience, developing breakthrough instrumentation ■ Collaboration and OEM agreements

### **Business Development, Strategy & Program Management Leadership**

#### ***At Crocombe Spectroscopic Consulting***

CSC provides strategic advice to companies engaged in spectroscopy, especially regarding miniature, portable and handheld instrumentation. Areas covered include instrumentation, technologies, supplier companies, competition, applications and use cases, market information, trends and go-to-market strategy, bringing innovative products to market, business contacts and partnerships, background on M&A, etc. — *assisting both early stage and established companies*

#### ***At PerkinElmer***

Defined 'In-Field' instrument strategy—*moving a traditional laboratory instrument company into small and field-portable instrumentation*

Integrated 'Torion Technologies' acquisition—*overall integration, manufacturing transfer, lean manufacturing, commercial re-orientation and channel conversion to direct from distributors, stabilization of major white label relationship, rationalization of R&D programs, re-branding, etc.*

#### ***At Thermo Fisher Scientific***

Implemented x-matrix methodology for strategy deployment in a \$2 billion division —*x-matrix, A3 action plans, bowlers, root cause countermeasures, key performance indicators, etc.*

Key player in acquisition of Ahura Scientific and Polychromix—*business planning, due diligence, integration manager, lead for new facility build-out. Coordinated facility moves with minimal disruption to shipments and revenue generation.*

Implemented gated product development and engaged all aspects of the business in the process for a business unit—*brought first product through the system in nine months, with first year sales of more than 1500 systems, and becoming highest volume product for the business.*

### **Career**

**EDITOR, Applied Spectroscopy Practica** 2025-Present

**FOUNDING EDITOR-IN-CHIEF, Applied Spectroscopy Practica** 2022 - 2024

Founding Editor-in-Chief for a new international, peer-reviewed, open-access, spectroscopic journal from the Society for Applied Spectroscopy. (A sister journal to the Society's well-established journal, Applied Spectroscopy). <https://journals.sagepub.com/home/APP>

**CROCOMBE SPECTROSCOPIC CONSULTING** 2017-Present

Principal—*providing go-to-market strategies for new spectroscopic products and emerging companies*

**PERKINELMER, Waltham, MA** 2015-2017

Senior Director, Environmental Health—*lead for just-acquired portable GC/MS business*  
Business Program Leader, Portables—*defined strategy for in-field instruments*

**THERMO FISHER SCIENTIFIC, Billerica and Tewksbury, MA** 2007-2015

Director, Strategy Deployment for Chromatography and Mass Spectrometry  
Division—*implemented x-matrix methodology for a \$2 billion division*

Director, Strategy Deployment for Portable Analytical Instruments—*acquisitions, integration,  
facility build-out and relocation*

Senior Manager, New Platform Development—*novel instrument development*

Program Manager—*implemented gated product development, fast-tracked programs*

Business Development Manager—*created plan for handheld optical instruments*

**AXSUN TECHNOLOGIES**, Billerica, MA

**2003-2007**

Senior Director, Marketing—*expanded markets for innovative optical instrumentation*

Director, Marketing—*developed and took to market disruptive photonics technology*

**DIGILAB LLC**, Randolph, MA

**2001-2002**

VP, Product Development & Engineering

**BIO-RAD LABORATORIES ■ Spectroscopy Division**, Cambridge, MA

**1981-2001**

Product Manager; Manager, Marketing & QC; Program Leader; Manager, RD&E

**UNIVERSITY OF TENNESSEE, KNOXVILLE ■** Postdoctoral Research Associate

**1977-1981**

**OAK RIDGE NATIONAL LABORATORY ■** Guest/Consultant

**1980-1981**

## Education

**Ph.D., Chemistry & Spectroscopy, University of Southampton**, England, 1977

**B.A. Honors; M.A.; Chemistry, Oxford University**, England, 1973; 1977

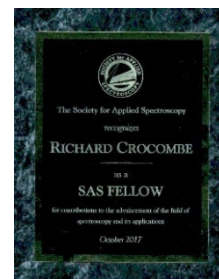
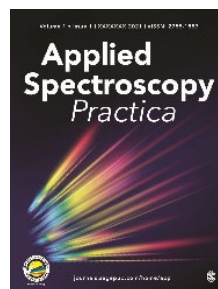
## Professional

### ■ Applied Spectroscopy Practica

Editor-in-Chief, (2022 - 2024)

Editor (2025 - )

<https://journals.sagepub.com/home/APP>



- Published extensively on miniature instruments, spectroscopy and imaging in refereed journals
- Invited speaker and symposium organizer at numerous meetings ■ Taught several short courses on portable spectroscopy ■ Frequent invited webinar speaker on portable spectroscopy – technologies and applications ■ Co-chair of SPIE 'Next-Generation Spectroscopic Technologies' conference (2009-present)
- Guest Editor for special issue of 'Applied Spectroscopy' on portable and handheld spectroscopy (May 2016) ■ **Williams-Wright Award for Industrial Spectroscopy, 2012** ■ Elected board member for professional societies ■ **Fellow, Society for Applied Spectroscopy** ■ 2020 President, Society for Applied Spectroscopy ■ **2022 EAS Award for Outstanding Achievements in Vibrational Spectroscopy (Presented at the Eastern Analytical Symposium, November 2022)** ■ **Fellow, SPIE 2024.**



## Recent Publications

Richard Crocombe, "Start-Ups, Established Companies, Mergers and Acquisitions in the Analytical Instrumentation Business", *Applied Spectroscopy Practica*, 3(2), A12-A14 (2025).

[https://www.nxtbook.com/societyforappliedspectroscopy/Practica/applied\\_spectroscopy\\_practica\\_03\\_02/index.php#/A12](https://www.nxtbook.com/societyforappliedspectroscopy/Practica/applied_spectroscopy_practica_03_02/index.php#/A12)

Richard Crocombe, "Why Most Instrument Startups Fail – and What to Do Differently", *The Analytical Scientist*, June 2025. <https://theanalyticalscientist.com/issues/2025/articles/june/why-most-instrument-startups-fail-and-what-to-do-differently/>

Richard A. Crocombe, Pauline E. Leary, Brooke W. Kammrath, Thomas J. Tague, Jr., William D. P. Costa, and Michael D. Hargreaves, "Using LEGO Blocks for the Evaluation of Fluorescence Avoidance and Mitigation in Handheld Raman Spectrometers". *Applied Spectroscopy*, June 2025, <https://doi.org/10.1177/0003702825134848>.

Richard A. Crocombe and Ellen V. Miseo, "Miniature spectrometers, multispectral sensors and the food chain", in Lien Smeesters et al., "2025 photonics for agrifood roadmap: towards a sustainable and healthier planet", pp. 130-135, 2025 *J. Phys. Photonics* 7 032501. <https://doi.org/10.1088/2515-7647/adbea9>

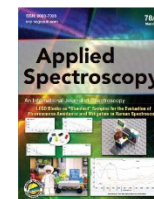
Crocombe RA. The Interplay Between Spectrometer Development and Professional Spectroscopic Societies. *Applied Spectroscopy*. 2024;78(5):449-455. doi:[10.1177/00037028241233307](https://doi.org/10.1177/00037028241233307) **Cover paper in May 2024 issue**



### Portable Spectroscopy – 2023 & 2024

Richard A. Crocombe, Brooke W. Kammrath, Pauline E. Leary, Thomas J. Tague and William D. P. Costa, "LEGO blocks as "Standard" Samples for Evaluation of Fluorescence Avoidance and Mitigation in Raman Spectroscopy", *Appl. Spectrosc.* 2024. 78(3): 340-348. DOI: [10.1177/00037028231221585](https://doi.org/10.1177/00037028231221585). **Cover paper in March 2024 issue.**

Richard Crocombe, "Near-infrared spectroscopy at Pittcon 2023", *NIR news*, Vol. 34, Issue 5-6, August-September 2023. <https://doi.org/10.1177/09603360231190>



Richard A. Crocombe, Greg Giuntini, David W. Schiering, Luisa T. M. Profeta, Michael D. Hargreaves, Pauline E. Leary, Christopher D. Brown and Jessamyn Ward Chmura, "Field Portable Detection of Fentanyl and its Analogs: A Review", *J Forensic Sci.* 2023; 68: 1570–1600. <https://doi.org/10.1111/1556-4029.15355>

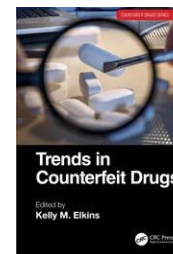


Volume 68, Issue 5  
Special Section on Fentanyl and its Analogs in Forensic Science

Pages: 1445-1845  
September 2023

Brooke W. Kammrath, Pauline E. Leary, and Richard A. Crocombe, "Detection and analysis of counterfeit drugs", Chapter 6 in *Trends in Counterfeit Drugs*, edited by Kelly M. Elkins. Routledge/Taylor & Francis/CRC Press, July 6, 2023. [ISBN 9781032024271](https://www.routledge.com/Trends-in-Counterfeit-Drugs/Elkins/p/book/9781032024271)  
<https://www.routledge.com/Trends-in-Counterfeit-Drugs/Elkins/p/book/9781032024271>

Richard A. Crocombe, Brooke W. Kammrath, Pauline E. Leary, "Portable Raman Spectrometers: How Small Can They Get?", *Spectroscopy Supplement, Raman Technology for Today's Spectroscopists*, Volume 38, Issue S6, June 2023, Pages: 32–40. <https://doi.org/10.56530/spectroscopy.cn5172t4>



Richard A. Crocombe, "Emerging technologies for miniature spectrometers and multispectral sensors," *Proc. SPIE* 12516, Next-Generation Spectroscopic Technologies XV, 1251609 (15 June 2023); doi:[10.1117/12.2665402](https://doi.org/10.1117/12.2665402)

Richard A. Crocombe, "Miniature and multi-spectral spectrometers in consumer goods and wearables," *Proc. SPIE* 12434, MOEMS and Miniaturized Systems XXII, 124340A (15 March 2023); doi: [10.1117/12.2645879](https://doi.org/10.1117/12.2645879)

### Portable Spectroscopy - 2022

Pauline Leary, Michael Cashman, Brooke Kammrath and Richard Crocombe, "Taking the spectrometer to the field for the analysis of illicit drugs", *Wiley Analytical Science*, Vol 8, December 2022. Article: <https://analyticalscience.wiley.com/doi/10.1002/was.001900072> and (full issue): <https://analyticalscience.wiley.com/doi/10.1002/was.001900067>

Richard Crocombe, "Spectrometers in Wonderland: Shrinking, Shrinking, Shrinking", *Spectroscopy Supplement*, 37(S11) 6-11, November 2022. <https://www.spectroscopyonline.com/view/spectrometers-in-wonderland-shrinking-shrinking-shrinking>

Richard Crocombe, "The Ever-Shrinking Spectrometer: New Technologies and Applications". In: Chu, X., Guo, L., Huang, Y., Yuan, H. (eds) *Sense the Real Change: Proceedings of the 20th International Conference on Near Infrared Spectroscopy. ICNIR 2021*. Springer, Singapore. [https://doi.org/10.1007/978-981-19-4884-8\\_2](https://doi.org/10.1007/978-981-19-4884-8_2)

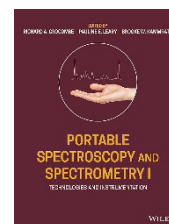
Richard Crocombe, "The Ever-Shrinking Optical Spectrometer Enhances Consumer Goods", *Photonics Spectra*, July 2022, 26-41. [https://www.photonicsspectra-digital.com/photonicsspectra/july\\_2022/MobilePagedReplica.action?pm=2&folio=36#pg36](https://www.photonicsspectra-digital.com/photonicsspectra/july_2022/MobilePagedReplica.action?pm=2&folio=36#pg36)

Richard Crocombe, "Portable Spectroscopy: Taking the Spectrometer to the Sample", *Laboratory News (UK)*, June 2022, 22-25. <https://cloud.3dissue.com/2153/2844/6246/laboratorynewsmay2022/index.html?r=53>

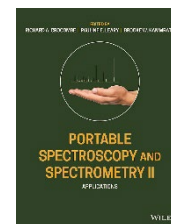
Richard Crocombe, "Pharmaceutical analysis with portable spectrometers", *European Pharmaceutical Review*, 27(1), 8-13 (February 2022). <https://www.europeanpharmaceuticalreview.com/article/168450/european-pharmaceutical-review-issue-1-2022/>  
<https://edition.pagesuite.com/html5/reader/production/default.aspx?pubname=&edid=166e8304-bafc-43dc-9b19-c49e379a3c1d>

## Portable Spectroscopy - 2021

Portable Spectroscopy and Spectrometry, Volume 1, Technologies and Instrumentation.  
Richard A. Crocombe (Editor), Pauline E. Leary (Editor), Brooke W. Kammrath (Editor)  
ISBN: 978-1-119-63641-0 John Wiley, Chichester UK and Hoboken NJ, USA, April 2021  
<https://onlinelibrary.wiley.com/doi/book/10.1002/9781119636489>



Portable Spectroscopy and Spectrometry, Volume 2, Applications  
Richard A. Crocombe (Editor), Pauline E. Leary (Editor), Brooke W. Kammrath (Editor)  
ISBN: 978-1-119-63642-7 John Wiley, Chichester UK and Hoboken NJ, USA, April 2021  
<https://onlinelibrary.wiley.com/doi/book/10.1002/9781119636489>



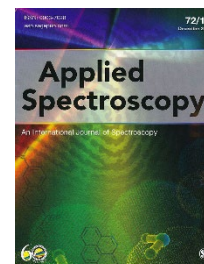
Richard A. Crocombe, Pauline E. Leary and Brooke W. Kammrath, "Packing Light: Spectroscopy Goes Mobile", *Photonics Spectra*, **55(1)**, 68-71 (January 2021).  
[https://www.photonics.com/Articles/Packing\\_Light\\_Spectroscopy\\_Goes\\_Mobile/a66471](https://www.photonics.com/Articles/Packing_Light_Spectroscopy_Goes_Mobile/a66471)

## Portable Spectroscopy – 2020 and earlier

Richard A. Crocombe, "The Future of Portable Spectroscopy", *Spectroscopy*, **35(7)**, 12-14 (July 2020).  
<https://www.spectroscopyonline.com/view/future-portable-spectroscopy>

Richard A. Crocombe "Portable spectroscopy in 2019: smaller, cheaper and in consumer products?" *Proc. SPIE 10983*, Next-Generation Spectroscopic Technologies XII, 109830J (13 May 2019); doi: 10.1117/12.2535599; <https://doi.org/10.1117/12.2535599>

Richard A. Crocombe, "Portable Spectroscopy", *Appl. Spectrosc.*, **72(12)**, 1701-1751 (2018).  
<https://doi.org/10.1177/0003702818809719>. A comprehensive, free-to-view, review article on this subject.



Richard A. Crocombe, "Handheld spectrometers in 2018 and beyond: MOEMS, photonics, and smartphones," *Proc. SPIE 10545*, MOEMS and Miniaturized Systems XVII, 105450C (22 February 2018); doi: [10.1117/12.2286492](https://doi.org/10.1117/12.2286492)

Richard A. Crocombe and Ellen V. Miseo, "Portable Spectroscopy and the Fight Against Food Fraud", *Photonics Spectra*, August 2017. <https://www.photonics.com/Article.aspx?AID=62147>

Richard A. Crocombe, "Handheld spectrometers: the state of the art", in "Next-Generation Spectroscopic Technologies VI", *SPIE Proceedings*, Vol. **8726**, 87260R-1 – 87260R-14 (2013).  
<https://www.spiedigitallibrary.org/conference-proceedings-of-spie/8726/87260R/Handheld-spectrometers-the-state-of-the-art/10.1117/12.2017892.short>

## Special Journal Issue

Richard A Crocombe and Mark A. Druy, Guest Editors for Special Issue of "Applied Spectroscopy" on Portable and Handheld Spectroscopy. *Appl. Spectrosc.* Vol. **70/5**, May 2016.

## Review articles on miniature spectrometers

Richard A. Crocombe, "Miniature Optical Spectrometers: The Art of the Possible. Part IV: New Near-Infrared Technologies and Spectrometers", *Spectroscopy*, **23(6)**, 26-37 (2008).

Richard A. Crocombe, "Miniature Optical Spectrometers: Part III: Conventional and Laboratory Near-Infrared Spectrometers", *Spectroscopy*, **23(5)**, 40-50 (2008).

Richard A. Crocombe, "Miniature Optical Spectrometers: Follow The Money. Part II: The Telecommunications Boom", *Spectroscopy* **23(2)** 56-69 (2008).

Richard A. Crocombe, "Miniature Optical Spectrometers: There's Plenty of Room at the Bottom. Part 1, Background and Mid-Infrared Spectrometers", *Spectroscopy* **23(1)** 38-56 (2008).

## Editor SPIE Conference Proceedings

Richard A. Crocombe, Luisa T.M. Profeta, Editors, "Next-Generation Spectroscopic Technologies XV", *SPIE Proceedings*, Vol. **12516**, 2023. <https://spie.org/Publications/Proceedings/Volume/12516>

Richard A. Crocombe, Steven M. Barnett, Luisa T.M. Profeta and Abul K. Azad, Editors, "Next-Generation Spectroscopic Technologies XII", *SPIE Proceedings*, Vol. **10983**, 2019.

Mark A. Druy, Richard A. Crocombe, Steven M. Barnett, Luisa T.M. Profeta and Abul K. Azad, Editors, "Next-Generation Spectroscopic Technologies XI", *SPIE Proceedings*, Vol. **10657**, 2018.

Mark A. Druy, Richard A. Crocombe, Steven M. Barnett, Luisa T. Profeta, Editors, "Next-Generation Spectroscopic Technologies X", *SPIE Proceedings*, Vol. **10210**, 2017

Mark A. Druy and Richard A. Crocombe, Editors, "Next-Generation Spectroscopic Technologies IX", *SPIE Proceedings*, Vol. **9855**, 2016; Mark A. Druy and Richard A. Crocombe, Editors, "Next-Generation Spectroscopic Technologies VIII", *SPIE Proceedings*, Vol. **9482**, 2015; Mark A. Druy and Richard A. Crocombe, Editors, "Next-Generation Spectroscopic Technologies VII", *SPIE Proceedings*, Vol. **9101**, 2014; "Next-Generation Spectroscopic Technologies VI", *SPIE Proceedings*, Vol. **8726**, 2013; "Next-Generation Spectroscopic Technologies V", *SPIE Proceedings*, Vol. **8374**, 2012; "Next-Generation Spectroscopic Technologies IV", *SPIE Proceedings*, Vol. **8032**, 2011.

Mark A. Druy, Christopher D. Brown, Richard A. Crocombe, Editors, "Next-Generation Spectroscopic Technologies III", *SPIE Proceedings*, Vol. **7680**, 2010; "Next-Generation Spectroscopic Technologies II", *SPIE Proceedings*, Vol. **7319**, 2009.

### Hyperspectral Imaging

J. Sellors, R. A. Crocombe, R. A. Hault and N. A. Wright, "FT-IR Imaging Hardware" in *Raman, Infrared, and Near-Infrared Chemical Imaging*, Slobodan Sasic and Yukihiro Ozaki, Editors, John Wiley, September 2010.

### Applications of miniature spectrometers

Larry P. McDermott, Robert K. Jenner and Richard A. Crocombe, "Identifying plastics and fibers for recycling is easier than ever: Hand-held technology traditionally reserved for metals is the key", *Recycling Product News* (September 2007).

Larry P. McDermott, Robert K. Jenner and Richard A. Crocombe, "Identification of Recyclable Polymers with a Handheld Near-Infrared Spectrometer", *American Laboratory News*, **39(19)** 18-20 (2007).

Jill Parris, Christian Airiau, Richard Escott, James Rydzak and Richard Crocombe, "Monitoring API Drying with NIR," *Spectroscopy*, April 2005.

Richard A. Crocombe, "Analytical spectroscopy benefits from telecom photonics," *Laser Focus World*, November 2004.

Richard A. Crocombe, "MEMS technology moves process spectroscopy into a new dimension," *Spectroscopy Europe*, June 2004, 16-19.

Richard A. Crocombe, "A New Breed of Process Instrumentation", *American Laboratory*, August 2004, 42-46.

Richard A. Crocombe, Dale C. Flanders and Walid Atia, "Micro-optical instrumentation for process spectroscopy", in "Lab-on-a-Chip: Platforms, Devices and Applications, edited by Linda A. Smith, Daniel Sobek, *Proceedings of SPIE*, **5591** 11-25 (2004).

Petros Kotidis, Walid Atia, Mark Kuznetsov, Steven Fawcett, David Nislick, Richard Crocombe and Dale C. Flanders, "Optical, Tunable Filter-Based Micro-Instrumentation for Industrial Applications", *ISA Technical Papers Collection* (The Instrument, Systems and Automation Society), **Volume 439**, 2003.

### Interviews, Podcasts, etc.

Richard Crocombe, "Through the Spectroscopic Glass: What might the future hold for optical spectroscopy and diagnostics?" *The Pathologist*, July 2024. <https://thepathologist.com/outside-the-lab/through-the-spectroscopic-glass>

Richard Crocombe, "Spectroscopy For Wearables and Human Health". An interview following a Symposium at Pittcon in San Diego, March 2024.

Interview: <https://www.news-medical.net/news/20240718/The-Future-is-Wearable-Advancing-Human-Health-Through-Portable-Spectroscopy.aspx>

Video: <https://youtu.be/kISTIMRGYfk>

Richard Crocombe, "Through the Spectroscopic Glass: What does the future hold for optical spectroscopy and diagnostics?". *The Analytical Scientist*, August 2024. <https://theanalyticalscientist.com/techniques-tools/through-the-spectroscopic-glass>

Richard Crocombe, "Exploring the World of Spectroscopy for Portable and Wearable Systems: Technology and Applications". <https://www.spectroscopyonline.com/view/ep-27-exploring-the-world-of-spectroscopy-for-portable-and-wearable-systems-technology-and-applications>. Also on [Apple Podcasts](#), [Spotify](#), and [SoundCloud](#)

### Short Courses Taught

#### 2020

Pittsburgh Conference, March 2020: Modern Portable Spectroscopy

Eastern Analytical Symposium, November 2020: Modern Portable Spectroscopy

## **2021**

Pittsburgh Conference, March 2021: Modern Portable Spectroscopy

## **2022**

Pittsburgh Conference, March 2022: Portable Optical Spectroscopy

## **2023**

SciX, October 2023: Technologies and Applications for Miniature Optical Spectrometers and Spectroscopic Sensors